AMAG08 SOIL AND WATER CONSERVATION AND STRUCTURES

UNIT-1 SOIL EROSION CAUSES

1.1 Types and agents of soil erosion; water erosion forms of water erosion, mechanics of erosion;
1.2 Effect of slope, slope length, soil, vegetation, topographical features and rainfall- on erosion, gullies and their classification, stages of gully development;
1.3 Soil loss estimation universal soil loss equation and modified soil loss equation, determination of their various parameters.

UNIT-2 EROSION CONTROL MEASURES

2.1 Agronomic measures contour cropping, strip cropping, mulching; mechanical measures terraces
2.2 Level and graded broad base terraces and- their design, bench terraces and their design, layout procedure, terrace planning,- bunds contour bunds,
2.3 Graded bunds and their design; gully and ravine reclamation principles of gully control vegetative and temporary structures; control measures for stream bank and coastal erosion.

UNIT-3 LANDSLIDES FACTORS CAUSING IT

3.1 Land slips, Measures for control; Sedimentation in reservoirs and streams; Estimation and measurement, sediment delivery ratio, trap efficiency; Land use capability classification;
3.2 Grassed waterways and their design; Introduction to water harvesting techniques; introduction to stream water quality and pollution.
3.3 Use of- Geotextiles in soil and water conservation.
3.4 Wind erosion factors affecting wind erosion,- mechanics of wind erosion, soil loss estimation, wind erosion control measures vegetative,
3.5 Mechanical measures, wind breaks and shelterbelts, sand dunes stabilization.

UNIT-4 CLASSIFICATION OF CONSERVATION STRUCTURES

4.1 Functional requirements of soil erosion control structures; flow in open channels types of flow, state of flow, regimes of flow, energy and momentum principles,
4.2 Specific energy and specific force, flow transitions due to hump and width variations; hydraulic jump and its application, type of hydraulic jump,
4.3 Energy- dissipation due to jump, jump efficiency, relative loss of energy; straight drop spillway general description, functional use, advantages and disadvantages,
4.4 Structural parts and functions; components of spillway, hydrologic and hydraulic design, free board and wave free board, aeration of weirs, concept of free and submerged flow.

UNIT-5 STRUCTURAL DESIGN OF A DROP SPILLWAY LOADS ON HEADWALL

5.1 Variables affecting equivalent fluid pressure, determination of saturation line for different flow conditions, seepage under the structure, equivalent fluid pressure,
5.2 Triangular load diagram for various flow conditions, creep line theory, uplift pressure-

5.3 Estimation, safety against sliding, overturning, crushing and tension;
5.4 Chute spillway general description and its components, hydraulic design,
5.5 Energy- dissipaters, design criteria of a SAF stilling basin and its limitations,
5.6 Drop inlet spillway general description, - functional use, design criteria; design of diversions;
5.7 Small earth embankments their types and design principles,
5.8 Farm ponds, percolation ponds, check dams and reservoirs.
5.9 Environmental impact assessment.

Reference Books:

1. Schwab, G.O, Frevert, R.K.,Edminister T.W., and Barnes,K.K. (1993). Soil and water conservation engineering. John Wiley and sons.
2. Singh,G. (1985). Manual of Soil and water conservation Practice in India.. Central Soil and water conservation Research and training institute, Dehradun.
3. Suresh, R. (1997). Soil and water Conservation Engineering. Standard Publishers and Distributors.